REMARKS

In the Office Action mailed December 21, 2005 (hereinafter, the "Office Action"), Claims 1-30 were pending for consideration. Of these, Claims 18-20 have been canceled and Claims 21-30 are withdrawn from consideration at this time. Claims 1-4 and 6-20 have been rejected as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention under 35 U.S.C. 112, second paragraph based on the phrase "substantially free of." Claims 18-20 were also rejected as indefinite as allegedly requiring other essential limitations regarding structures not specified in the claim. Finally, Claims 1-20 have also been rejected as obvious under 35 U.S.C. 103(a) over nine different references, individually and in various combinations. Additionally, the disclosure has been objected to in light of alleged informalities.

By the present amendment, Claims 18-20 has been canceled without prejudice to pursue canceled subject matter in a future application and are made solely for expediting prosecution. Therefore, the rejection of these claims is moot. Further, withdrawn Claim 21 has also been amended to require the limitations of the elected invention of amended Claim 1 pursuant to MPEP 821.04 in order to preserve the right to rejoinder.

Accordingly, Claims 1-17 remain pending for consideration in the present application, and reconsideration thereof is respectfully requested.

Disclosure Objection

The Examiner objected to the disclosure on the grounds that the limitation "mass containing greater than about 95% by volume nanodiamond and greater than about 98% by volume carbon" is

confusing because the total volume percent is greater than 100%. Applicant appreciates the concerns raised by the Examiner. Respectfully, Applicant believes that the specification is clear as presented.

Specifically, as noted by the Examiner, nanodiamond is formed of carbon. Further, as correctly pointed out by the Examiner carbon can be found in many different forms such as nanodiamond, diamond, graphitic carbon, amorphous carbon, and the like. The Examiner has misinterpreted our statement in the last response. Specifically, we stated that "carbon" in the present application means "carbon," not "diamond." This is a true statement and consistent with the claims and specification. Carbon does not mean diamond. Rather, carbon is a material which can be found in many different forms, one of which is diamond. Therefore, in context of the claims and the specification, "carbon" refers to carbon generally while nanodiamond refers to a specific allotrope of carbon. Therefore, the term carbon is not limited to diamond or nanodiamond materials. There is no contradiction in these statements.

Thus, there is no inconsistency in stating that the sintered product contains greater than 95% by volume nanodiamond and is greater than 98% by volume carbon. Stated another way, greater than 98% by volume is carbon, of which carbon most is in the form of nanodiamond such that in the final product greater than 95% by volume is nanodiamond. Although the preferred product will have identical contents of carbon and nanodiamond, i.e. all of the carbon is in the nanodiamond form, there is often a residual carbon which is not nanodiamond. For example, page 9, lines 1-3 states that some of the carbon content in the final tool can be graphitic carbon or combustion products which are difficult to entirely avoid. The specification is merely describing and quantifying acceptable amounts of non-nanodiamond carbon within the product. This manner of describing materials is

akin to stating that one has two boys and in the next breath stating that they have four children. This statement is entirely unconfusing, as it is clear that of the four children, two are boys. This does not suggest that the person has six children. In this same manner, the term "carbon" is a genus for which "nanodiamond" is a species such that the volume content requirements of each may overlap. Applicant therefore respectfully submits that the specification is not confusing for the reasons set forth above and requests that the objection be withdrawn.

Rejection Under 35 U.S.C. §112 Second Paragraph

In the Office Action, the Examiner rejected claims 1-4 and 6-20 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Examiner asserts that the phrase "substantially free of" is unclear as to what is encompassed and that the Applicant's own definition in the specification is insufficient to remedy this supposed lack of clarity.

The Examiner notes that the Applicant has defined "substantially free" as "the absence of the material...in an amount that is insufficient to impart a measurable effect." Page 7, lines 1-4. The Applicant appreciates the concerns raised by the Examiner. Thus, by this definition, a nanodiamond article which "is substantially free of non-carbon constituents" refers to an article having either a complete absence of such constituents or such a small amount so as to not measurably affect the properties of the tool. As is clear by the context, the measurable affect refers to mechanical properties such as hardness, wear resistance and other properties of concern to the particular tool formed. A measurable affect would be any measured property having a statistically significant degree of change with respect to the property of interest, e.g. hardness, wear resistance, etc. The

allowable amount of impurities can also depend on the type of impurity, e.g. cobalt content can be more detrimental than silicon, tungsten or aluminum. Those skilled in the art can readily determine at what point impurities or non-carbon materials change such properties.

The Examiner has requested "evidence that a sintering aid will materially effect the basic and novel properties of the claimed invention" and that "any small amount of additive used by the references is not within the scope of the "essentially free of" limitation." Page 6 of the Office Action. It is the Applicant's position that the presence of sintering aid is undesirable and as such even small amounts can reduce the high temperature performance of the final tool. Specifically, most sintering aids such as cobalt, nickel and iron back-convert diamond to graphite at temperatures above about 700 °C to about 1000 °C, depending on the particular sintering aid. Such back-conversion creates weaknesses in the tool which leads to micro-cracks and eventually failure. The tools of the present invention would be considered "thermally stable" because of the absence of such sintering aids. As will be shown below and discussed to some extent previously, the references cited require the presence of sintering aids in amounts which will exceed the "substantially free of" limitation of the claimed invention. Specifically, any amount of sintering aid which is sufficient to cause sintering of diamond to form a useful polycrystalline diamond tool would be, by definition, a substantial amount, i.e. "imparts a measurable effect." The amounts allowable in the present invention would fall far below those used by the prior art since even small amounts insufficient to form a useful PCD tool in the prior art, would be more than sufficient to create weak spots and micro-cracks due to localized back-conversion of diamond to graphite. For example, cobalt and other sintering aids are catalyst materials which can back-convert any diamond which is contacted by the catalyst during high

temperature operation. Thus, the terms "consisting essentially of" and "substantially free of" in context of the claimed invention provide ample direction as to allowable contents of non-carbon substituents. Therefore, Applicant request that the rejections under 35 U.S.C. 112, second paragraph be withdrawn and the claims passed to issuance.

Rejection Under 35 U.S.C. § 103(a)

Claims 1-20 were pending for consideration in the Office Action. All of these claims were rejected as allegedly obvious under 35 U.S.C. § 103(a) over a number of references and combinations of references. Specifically;

(a) Claims 1-10 and 16-20 were rejected as allegedly obvious over Akashi et al.,

(b) Claims 1-20 were rejected as allegedly obvious over Phaal et al.,

(c) Claims 1-20 were rejected as allegedly obvious over Wentorf, Jr. et al.,

(d) Claims 1-4, 6-10 and 16-20 were rejected as allegedly obvious over Sumiya et al.,

(e) Claims 1-11 and 15-20 were rejected as allegedly obvious over Yoshida et al.,

(f) Claims 1-4, 6-11 and 15-20 were rejected as allegedly obvious over Nakai et al.,

(g) Claims 1-10 and 16-20 were rejected as allegedly obvious over JP 2-30667,

(h) Claims 1-11 and 15-20 were rejected as allegedly obvious over Cerutti,

(i) Claims 1-20 were rejected as allegedly obvious over Hall et al.,

(j) Claims 11 and 15 were rejected as allegedly obvious over Akashi et al., applied to Claim 1 and in view of Cerutti,

(k) Claims 11 and 15 were rejected as allegedly obvious over JP 2-30667 applied to Claim 1 and in view of Cerutti,

(l) Claims 11 and 15 are rejected as allegedly obvious over Sumiya et al. applied to Claim 1 and in view of Cerutti, and

(m) Claims 12-14 were rejected as obvious over either (1) Cerutti as applied to Claim 11, (2) Akashi et al. in view of Cerutti as applied to Claim 11 (3) JP 2-30667 in view of Cerutti as applied to Claim 11, (4) Sumiya et al. in view of Cerutti as applied to Claim 11 above, or (5) Yoshida et al. as applied to Claim 11 above all in view of Phaal et al. and Wentorf, Jr. et al.

Applicant respectfully submits that the rejected claims are patentable over the cited references for the reasons set forth below, and requests that the rejections be withdrawn.

Before discussing the § 103 rejections, it is thought proper to briefly state what is required to sustain such a rejection. The issue under § 103 is whether the PTO has stated a case of *prima facie* obviousness. "The PTO has the burden under § 103 to establish a *prima facie* case of obviousness." In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). To satisfy this burden, the PTO must meet the criteria set out in M.P.E.P § 706.02(j):

> . . . three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

With the above background in mind, the rejections under 35 U.S.C. § 103 will be discussed. Applicant contends that the PTO has failed to make a *prima facie* case of obviousness in that: i) it

has failed to show motivation to combine the cited references; ii) that the cited references fail to provide a reasonable expectation that the proposed modification will succeed; and iii) that the cited references fail to teach or suggest all of the claim limitations of Applicant's invention.

The Examiner alleges that cited references, either alone or in combination with one another, reasonably teach or suggest the limitations of the rejected claims. According to the Office Action, it would have been obvious to one skilled in the art at the time of the invention to use the prior art references, either alone or in combination with one another, to create a tool by sintering a mass of nanodiamond particles, said mass containing greater than about 95% by volume nanodiamond and greater than about 98% by volume carbon.

Declaration of Dr. Hyun Sam Cho

In light of the position outlined by the Examiner, the Applicant has consulted an independent expert in the field of polycrystalline diamond materials. Dr. Cho is a world recognized expert in the field and personally knows many of the inventors listed on the cited patents. Dr. Cho currently develops PCD and diamond tools and is considered by many to be one of the world's foremost experts in this field.

The enclosed declaration speaks for itself. In order to establish a prima facie case of obviousness the Examiner must provide some suggestion or motivation to one skilled in the art to modify the references. Based on Dr. Cho's review of the cited patents it is his opinion that none of them teach or suggest the absence of sintering aid and a sintered nanodiamond.

Discussion

The following discussion is directed to the issues raised as pertinent to the independent claim

of the application. It is recognized that the issues raised by the Examiner pertaining only to dependent claims are addressed by discussions regarding the independent claims, as they are in this case rendered moot if the independent claim(s) are found allowable. The dependent claims are narrower in scope than the independent claims from which they depend, and in the present circumstances are patentable if the independent claim(s) are patentable.

Although the declaration of Dr. Cho should be sufficient, the following discussion outlines in more detail the basis for our position that none of the cited references would render the claimed invention obvious. With an interest toward succinctness, we refer the Examiner to the previous discussion which is fully pertinent to the following discussion. However, the following discussion will focus primarily on the specific passages pointed to as allegedly supporting the obviousness rejections.

Akashi et al.

Akashi teaches that the disclosed invention is useful in the consolidation or densification of diamond powders, "with or without additives." Col. 8, lines 16-18. In light of the reference as a whole this would appear to be a suggestion without substance. In particular, the reference clearly teaches that the additives have the affect of increasing hardness and reducing cracks. See col. 7, lines 47-58. It is our position that this statement is an attempt by the patent drafter to broaden the disclosure.

However, regardless of the presence of an additive, the reference fails to teach or suggest nanodiamond. The affidavit of Dr. Cho supports this position. Specifically, in col. 7, lines 28-30 Akashi clearly teaches micron diamond by stating "the diamond is preferably between 0 grade and

1000 grade." This is conventional terminology for micron size diamonds. In particular, "0 grade" refers to a fine grade of micron diamond, typically about 1-2 micron in size. Nothing in this reference teaches or suggests the distinct class of materials referred to as nanodiamond.

There is arguably no teaching of the absence of a sintering aid and clearly no teaching of nanodiamond. Further, there is no motivation either in the reference or to one skilled in the art (e.g. Dr. Cho) to substitute the disclosed micron diamond with nanodiamond as claimed by the Applicant. Therefore, Applicant respectfully requests that the rejection based on Akashi be withdrawn.

Phaal et al.

The Examiner has pointed to col. 2, lines 56-55 as teaching that the mass and layer may contain a second phase, e.g. catalyst. The Examiner is correct in the position that in some disclosed embodiments the "two zones of the abrasive compact" may have no catalyst/solvent. However, Phaal also clearly teaches that the "abrasive compact may be made using conditions and materials known in the art." Col. 2, lines 52-53. Consistent with this idea, the following paragraph after stating that the catalyst/solvent may be present also states that the "source of the cobalt, nickel or iron will be the cemented carbide support body." Col. 2, lines 62-65. Thus, even in the absence of catalyst in the two zones, the final product will contain sintering aid by virtue of infiltration of sintering aid from the adjacent cemented carbide into the diamond mass. It is well known that polycrystalline diamond is conventionally formed by packing diamond powder with a sintering aid powder and/or by placing the diamond powder adjacent a cemented carbide substrate. Such cemented carbide substrates inherently contains a sintering aid, i.e. the "cemented" language indicates the presence of sintering aid. Thus, Applicant asserts that in no case does the Phaal

reference teach or suggest that no catalyst could be present in the final tool. Therefore, Applicant also requests that the rejection based on Phaal be withdrawn.

Wentorf Jr. et al.

The Wentorf reference fails to teach or suggest that no catalyst is present. In contrast, the Wentorf consistently and repeatedly teaches that catalyst is required. Further, all disclosed embodiments describe the presence of a catalyst. Specifically, column 4, lines 12-21 outline fundamental understanding in the art that cobalt (or other catalyst) is present.

> "Each mass 34 consists of a carbide molding powder, preferably a mixture of tungsten carbide powder plus cobalt powder. Unexpectedly, *whether or not the carbide molding powder is initially separate* from the diamond powder as shown in FIG. 2 or whether some carbide molding powder is mixed with the diamond, the cobalt content makes itself available to function both (a) as the metal bond for sintering the carbide and (b) as a diamond-making catalyst ***required*** for conversion of graphite to diamond." (emphasis added)

As mentioned earlier, the term "cemented carbide" refers specifically to a carbide material containing a catalyst or other sintering aid. Typically this is referred to as a cobalt cemented tungsten carbide substrate; however, generically a cemented carbide refers to a carbide material containing a sintering aid. This is a well known and accepted term of art used in the industry of diamond sintering. Therefore, Claim 1 of Wentorf is consistent with the above passage and the associated specification by clearly teaching the requirement of a "mass of cemented carbide." Col. 12, line 5. No other passage of Wentorf suggests or teaches that the catalyst is entirely optional. Rather, various

passages suggest that the catalyst (or cemented carbide pieces) can be mixed with the diamond powder, infiltrated from an adjacent cemented carbide, and/or additional thin sheets of catalyst. See col. 6, lines 14-17. Therefore, catalyst material is required by Wentorf in all disclosed embodiments and no suggestion that it is entirely optional.

Wentorf does state that the "preferred diamond content of mass 36 will range from 90 to 99+ percent by volume." Col. 6, lines 9-10. However, Applicant asserts that this upper range would not be possible using the technology of Wentorf. It is well known that such conventional PCD materials have a maximum volume content of about 96%, with 97% being an upper limit. Thus, the statement of 99+ is unrealistic and appears to be an attempt to broaden the disclosure by the patent drafter. Regardless, Wentorf requires catalyst in an amount sufficient to sinter the diamond powder into a useful tool. By definition, this amount of catalyst would be a "substantial" amount as distinguished by the Applicant's claimed invention since the remaining catalyst would serve to weaken the tool under high temperature operation, e.g. above about 700 °C. Therefore, Wentorf fails to teach or suggest each and every element of the claimed invention, e.g. substantially free of non-carbon constituents and content of nanodiamond. Further, there is no motivation to those skilled in the art to make the modifications necessary to arrive at the claimed invention. Applicant therefore respectfully requests that the rejection based on Wentorf be withdrawn.

Nakai et al.

Nakai teaches the use of a sintering aid as mentioned by the Examiner. For the same reasons as provided above, any content of sintering aid which is sufficient to cause sintering of diamond powder to form a useful tool is also a substantial amount. Specifically, such an amount of catalyst

would cause back-conversion of diamond into graphite under high temperature operating conditions, e.g. above about 700 °C, and ultimately failure of the tool. Such a failure would be a "material effect" on the basic and novel properties of the claimed invention. Therefore, Applicant respectfully submits that the claims are patentable over the Nakai reference and requests that the rejections based thereon be withdrawn.

Sumiya et al.

Sumiya clearly teaches a catalyst sintered diamond body. For the same reasons as provided above, the contents of sintering aid taught by Sumiya would materially effect the basic and novel properties of the claimed invention and would exceed the "substantially free of" limitation per the Applicant's definition of the phrase. Applicant request that the rejections based on Sumiya also be withdrawn.

Yoshida et al.

As with Sumiya, Nakai, Wentorf and others, the Yoshida reference teaches a catalyst sintered diamond body. For the same reasons as provided above, Yoshida fails to teach or suggest each and every claimed limitation. Applicant request that the rejections based on Yoshida also be withdrawn.

JP 2-30667

Applicant directs the following discussion to the rejections raised with respect to the JP 2-30667 reference. The JP 2-30667 reference does not teach or suggest all of the limitations set forth in Claim 1. Specifically, the JP 2-30667 reference does not teach or suggest a sintered mass containing greater than about 95% by volume nanodiamond. Accordingly, the Office has not satisfied the third element required for a prima facie case of obviousness, which is that the prior art

references must teach or suggest all of the claim limitations. Accordingly, JP 2-30667 does not render obvious the claims of the present invention.

Applicant agrees that the JP 2-30667 reference appears to teach volume percent of carbon in excess of 95%. However, the JP reference does not teach or suggest a sintered mass greater than about 95% by volume nanodiamond. Specifically, the abstract of the JP reference appears to teach tri-modal packing of diamond particles. The three particles taught by this reference include primary polycrystalline fine particles and secondary medium/coarse size polycrystalline particles, followed by a third medium single crystal powder. The combination of these three different particles types would prevent any nanodiamond content to be greater than 95% by volume. In view of the foregoing, the present invention is not obvious in light of the JP reference and the rejection based thereon should be withdrawn.

Cerutti Reference

The Cerutti reference does not teach or suggest all of the limitations set forth in Claim 1. Specifically, the Cerutti reference does not teach or suggest a sintered mass which consists essentially of carbon and is substantially free of non-carbon materials. For the same reasons as provided above in connection with discussions of Wentorf and Phaal, the Cerutti reference fails to teach nanodiamond or a body "substantially free of non-carbon constituents." For example, column 7, line 68 through column 8, line 8 states:

> "With respect to the catalyst/sintering aid, desirably this material is contained within the cemented metal carbide and infiltrates therefrom through the mass of crystals. Alternatively, the catalyst/sintering agent may be admixed with the mass of

abrasive particles or can be a separate layer placed adjacent mass of diamond particles or interposed between the mass of diamond particles and mass of cemented metal carbide, all such techniques having been disclosed in the art."

The phrase "optionally a catalyst" found in the abstract and elsewhere of the Cerutti reference is consistent with the teaching that a catalyst is required. Regardless of whether the catalyst is part of the "mass" placed in the cup assembly, Cerutti also requires a "mass of cemented metal carbide" which contains a sintering aid that infiltrates into the diamond powder during high temperature sintering. Therefore, Cerutti fails to teach a final tool which is substantially free of non-carbon constituent as claimed by the Applicant. Further, as explained above, any amount of sintering aid which is sufficient to sinter diamond to form a useful tool is also a substantial amount which exceeds the claimed limitations.

Accordingly, the Office has not satisfied the third element required for a prima facie case of obviousness, which is that the prior art references must teach or suggest all of the claim limitations. Accordingly, Cerutti does not render obvious the claims of the present invention. Accordingly, Applicant respectfully submits that the rejections based on Cerutti be withdrawn.

Hall et al. Reference

The Hall et al. reference does not teach or suggest all of the limitations set forth in Claim 1. Specifically, the Hall et al. reference does not teach or suggest sintered nanodiamond which is substantially free of non-carbon constituents. As the Hall reference is forming PCD masses from micron diamond (per affidavit of Dr. Cho and a reading of the reference), the only mechanism by which the diamonds could be sintered is by the action is a catalyst. It is noted that Hall states that "in

the first layer, the volume percent of PCD is highest when measured at the exposed or working surface (most preferably 100%) and then gradually decreases toward the interface with the second layer." Col. 4, lines 19-25. This mention of 100% can be viewed as including whatever sintering aid was used to form the PCD; however, at best this is an aspiration which cannot be achieved. As mentioned earlier, the maximum volume percent of diamond in conventional PCD is about 97%.

As support for this position, the Hall reference clearly teaches that this same "first layer" comprises "a quantity of diamond crystals together with a suitable catalyst/binder material, preferably the same catalyst/binder material as in the transition layer. Again, the catalyst binder in this layer 25 may alternatively be either partially or entirely provided from the binder which migrates from the precemented carbide pieces 22. This layer 25 can be simply poured into the metal enclosure 17 on top of the transition layer 24. This layer 25 will include the exposed or working surface of the composite compact produced." Col. 7, lines 5-15. Thus, as can be seen the first or outer layer will have at least some sintering aid which is required to achieve sintering of the diamond particles. Claim 1 does not indicate that no catalyst would be present in the final tool. In contrast, the above passage clearly indicates that the "precemented carbide pieces" found in Claim 1 would include such a catalyst material which infiltrates into the first layer to facilitate sintering of the diamond.

Accordingly, the Office has not satisfied the third element required for a prima facie case of obviousness, which is that the prior art references must teach or suggest all of the claim limitations. Accordingly, Hall et al. does not render obvious the claims of the present invention. Thus, Applicant respectfully requests that the rejection in light of Hall be withdrawn.

Akashi et al., Claims 11 and 15 as applied to Claim 1 and in view of Cerutti

Applicant respectfully submits that the Akashi et al. and Cerutti references are not properly combined to support a § 103 rejection for a number of reasons. First, the Akashi et al. and Cerutti references teach away from the combination claimed in the present application. Cerutti teaches polycrystalline compact tool blanks with flat carbide support/diamond or CBN interfaces wherein the diamond crystals are in the micrometer range. Akashi et al. teaches a diamond compacted composite that can be used as a cutting tool. Each reference teaches or suggests diamond composite materials comprised of diamond particles and diamond crystals in the micrometer range which are conventional cobalt sintered materials, which by design include non-carbon constituents. As argued above, neither of these references teaches or suggests sintered nanodiamond materials which are substantially free of non-carbon constituents. The affidavit of Dr. Cho further reinforces these arguments by finding that these references do not teach nanodiamond, contrary to the assertions of the Examiner. As such elements are not taught or suggested by the references either alone or in combination, they fail to establish a prima facie case of obviousness.

JP 2-30667 applied to Claim 1 and in view of Cerutti

Applicant respectfully submits that the JP 2-30667 and Cerutti references are not properly combined to support a § 103 rejection for a number of reasons. First, the JP 2-30667 and Cerutti references teach away from the combination claimed in the present application. Cerutti teaches polycrystalline compact tool blanks with flat carbide support/diamond or CBN interfaces wherein the diamond crystals are in the micrometer range. JP 2-30667 teaches a diamond compacted composite that can be used as a cutting tool. Again, each of these references appear to teach conventional

cobalt sintered diamond materials which include various non-carbon materials.

Following the teachings of either JP 2-30667 or Cerutti, or JP 2-30667 and Cerutti in combination, would not result in a nanodiamond article which is substantially free of non-carbon constituents. Specifically, Cerutti fails to teach or suggest either nanodiamond or tools without sintering aid as discussed more fully above. Similarly, JP 2-30667 fails to teach or suggest the claimed nanodiamond contents. Even if a combination were proper, which we do not concede, the combination fails to teach or suggest each and every element of pending Claims 11 and 15 as applied to Claim 1. In light of the above comments, Applicant respectfully submits the art cited in the Office Action fails to teach or suggest each of the elements of the claimed invention. As such, the third element of the *prima facie* case necessary to support a § 103 rejection was not established in the Office Action. Accordingly, Applicant respectfully requests that the rejection based on the combination of JP 2-30667 and Cerutti be withdrawn.

Sumiya et al. applied to Claim 1 and in view of Cerutti

Applicant respectfully submits that the Sumiya et al. and Cerutti references are not properly combined to support a § 103 rejection for a number of reasons and further fail to teach or suggest each and every element of the claimed invention. As discussed above, neither Cerutti nor Sumiya teaches sintered nanodiamond particles without a conventional sintering aid such as cobalt. Nothing in the combination of references teaches or suggests a mass of sintered nanodiamond particles, having substantially no non-carbon constituents. Further, the affidavit of Dr. Cho reinforces the position that neither reference teaches nanodiamond tools without sintering aids.

In light of the above comments, Applicant respectfully submits the art cited in the Office

Action fails to teach or suggest each of the elements of the claimed invention. As such, the third element of the *prima facie* case necessary to support a §103 rejection was not established in the Office Action. Accordingly, Applicant respectfully requests that the rejection be withdrawn.

(1) Cerutti as applied to claim 11, (2) Akashi et al. in view of Cerutti as applied to claim 11 (3) JP 2-30667 in view of Cerutti as applied to claim 11, (4) Sumiya et al. in view of Cerutti as applied to claim 11 above, or (5)Yoshida et al. as applied to claim 11 above all in view of Phaal et al. and Wentorf, Jr. et al.

Applicant respectfully submits that none of the immediately preceding references are properly combined to support a § 103 rejection for a number of reasons, and therefore the rejection should be withdrawn. Specifically, as discussed above, none of the cited references teach or suggest sintered nanodiamond articles which are substantially free of non-carbon constituents either alone or in combination. As outlined in detail previously, none of these references teaches or suggests the claimed nanodiamond volume contents which are also substantially free of non-carbon constituents such as sintering aids. Further, it is noted that Dr. Cho has also specifically found that the noted references do not teach nanodiamond nor do they teach an absence of sintering aid to someone skilled in the art. In light of the above comments, Applicant respectfully submits the art cited in the Office Action fails to teach or suggest each of the elements of the claimed invention. As such, the third element of the *prima facie* case necessary to support a §103 rejection was not established in the Office Action. Accordingly, Applicant respectfully requests that the above rejection be withdrawn.

CONCLUSION

In view of the foregoing, Applicant believes that presently pending Claims 1- 17 present allowable subject matter and allowance is respectfully requested. If any impediment to the allowance of these claims remains after consideration of the above remarks, and such impediment could be resolved during a telephone interview, the Examiner is invited to telephone Mr. Erik Ericksen, or in his absence, the undersigned attorney, at (801) 566-6633, to address such issues as expeditiously as possible.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 20-0100.

Dated this 22nd day of May, 2006.

Respectfully submitted,

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